

AVIATION WEEK

JULY 7, 1947

INCORPORATING AVIATION AND AVIATION NEWS

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DETROIT



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Wright steel crankcases last the life of the engine. Original steel crankcases are still in use on Wright Cyclone engines which have logged more than 25,000 hours each of airline flight time. To the airline operator, steel crankcases guarantee reduced overhaul costs and unmatched reliability—a feature available only in Wright Cyclone engines.

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POWER FOR AIR PROGRESS

SEE PAGE 21

VICKERS HYDRAULIC EQUIPMENT ON CONVAIR-240

17K 477 July - Sept. 1947



Vickers
Series 35-1000
Accumulator



Vickers Series 35-1000 Control
Supplement Piston Type Pump



Vickers
Series 35-1000 Piston Type Pump
(Overhaulable maintenance—factory
variable volume with over-riding flow)



Vickers
Series 35-1000
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Vickers
Series 35-1000
Solenoid Valve (2 Port)



Vickers
Series 35-1000 Control
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Series 35-1000
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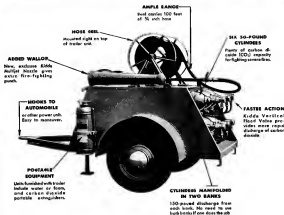
Vickers Series 35-1000 Control
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TEXACO Lubricants and Fuels

FOR THE AVIATION INDUSTRY

See it...**TEXACO STAR THEATRE** presents the NEW COMET MARTIN BROW every Sunday night. See newspaper for time and address.

SAFETY IN THE AIR—Although newspaper headlines had calmed down somewhat after proclaiming the latest series of air crashes, repercussions continued in the airlines. Big question: Can the carrier survive economic drains occasioned by severe safety regulations?

Speculation on future reports of the President's special investigating board was the top conversation in the industry. In addition to chipping take-off loads, the Board may:

1. Make a third cockpit crewman mandatory, a pilot navigator, long demanded by pilot union chief Schrecke.
2. Force a half-hour rest for CAA practices and procedures.
3. Amend Part 04 of the FAR. Some previous revisions have not even gone into effect. This may be stage dropping, as DC-10 operates under 04, not the DC-10 which started the present storm.

LANDIS RUNS THE SHOW—CAA Chairman James Landis is running the presidential board. Most astounded observers say he needs a membership. While a popular vote game among aircraft manufacturers is why none of their representatives was included, the industry's top policy-makers really are not deeply concerned. According to one source, Landis telephoned a manufacturers' spokesman to invite him to participate but, strangely, was unable to reach him and the matter was not followed up. Aircraft makers are convinced, however, that original design and construction are not involved.

LANDIS-INDUSTRY RIFT—There is growing evidence that the airlines and Landis are getting farther apart every day. Landis is adamant on the safety subject. So is the Air Line Pilots' representative. The airlines want safety too, but they point out that in transportation you can make so many safety regulations you will never operate a schedule. The only wing-woman, plane or bus is not that never moves. Airline management is deeply concerned over the economic aspects of onerous regulations which may be imposed by the Truman Board.

PERSONAL PLANE SHAKEUP—Next to airline safety, biggest conversation piece was Ryan's purchase of the *Nation* and Texas Engineering's acquisition of the *Globe Swift* and *Johnson Rocket*.

Because of the depressed personal plane market, there have been no optimistic evaluations of these moves. Both purchases have intriguing angles. *Reconstruction of the Nation* gets one of the life-line's richest post-bonuses back into the business. Although he has been away for a long time, Ryan is not a gremlin.

Part act of Texaco after buying the *Swift* was to announce a big price cut. Miles interest in this attaches

to the fact that while everyone agrees personal planes are too expensive, few manufacturers have admitted, or will admit, that they can cut prices.

Don't forget that the *Swift*, with a 125hp engine and a retractable landing gear, now drops plump into the same general price class as the other all-metal ships on the market—*Lucascomb*, *Comau* and *Encounter*—two-placer with 85hp. *Texaco* has a good production record. It has written off all development and tooling costs and took over a sizable inventory of completed planes. Meanwhile, *Lucascomb* cut production, *Piper* deferred action on a preferred dividend.

The personal aircraft industry is in a revolution. Results will be fewer manufacturers, lower prices, and improved models to keep up with the competition.

MILITARY AIRCRAFT AND THE HILL—While during the general interest in the safety investigation, military aircraft manufacturers were keeping an eye on Capitol Hill last week. With the shape of this fiscal year's military and Naval appropriations now known, the industry can figure out tentatively about where they stand.

It's an uncomfortable spot. With money already obligated, plus fiscal '48 funds, the next 12 months should be no worse than the last. This should be a little better. But after that the outlook is dark.

Heavy aircraft makers are watching most carefully the national air policy legislation moving in the Senate. If this can be enacted in the waning days of this legislative session, it may exert a powerful influence on future appropriations. If an air policy bill fails to get by the "back-house" rash, some manufacturing people feel the last opportunity has passed.

WASHINGTON OBSERVERS PREDICT:

- The new world's speed record of 623 mph may be broken in a few weeks by the new Lockheed P-50B that set the new mark. Pilot Albert Bond heard no compressibility trouble, and did not use full power from the Allison-built J33 engine. Florida is being discussed as scene of the next attempt.
- Despite the flat statement of the British Minister of Civil Aviation that Britain would not buy more U. S. transports except those already on order, British Overseas Airways are likely to receive more *Constellations*.
- Export-Import Bank shortly will announce another manufacturer's participation loan for foreign purchase of U. S. transports.
- Unification of the armed services is almost certainly cutting off hearings in the House Armed Services Committee was the top-off, according to merger proponents.
- Although CAA is getting its cumbersome airport and machinery moving, modern air carriers are convinced the regulations will still keep the pace to a crawl.



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A remarkable new upholstery fabric! Developed in cooperation with automobile and aircraft engineers, TAN-O-LITE has extraordinary strength... lightness... durability... beauty. Its stain-proof finish is easy to clean, never cracks or peels, withstands years of abuse. You'll admire its supple sleekness, its glowing, stay-bright colors, its rich leather effects. And this way-coated fabric is completely **FLAMEPROOF**. Its versatility, its low cost makes it practical for a multitude of other uses, too. Write today for complete information and details.



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NEWS DIGEST

DOMESTIC

William A. M. Burden's resignation as Assistant Secretary of Commerce for air has been accepted by President Truman as of June 30. Pending appointment of a successor, Burden's duties will be divided between CAA administrator T. P. Wright and William C. Foster, Under Secretary of Commerce.

Western Air Lines will inaugurate its AM 45 route between San Francisco, Portland and Seattle around July 15.

Mig Alexander P. de Novinsky was awarded the Hansen International Trophy for his wartime contribution to the defeat of long range scout fighters and strategic bombardment theory.

Continental Air Lines has appointed Allen P. Stacey as director of engineering and maintenance to replace Stanley K. Skelton who resigned effective July 15. Russell C. Kozco, who recently resigned as vice-president of Western Air Lines, has been named vice-president of Continental with offices in Washington.

House Aeronautics Committee approved legislation authorizing a \$254,000,000 Navy public works program including \$14,000,000 for development of the F1 Miigs, Cal.-guided missile test range.

President Truman requested a supplemental appropriation of \$5,156,000 to cover payment on an unanticipated volume of aircraft current during the last few months of the 1947 fiscal year.

Chas. Conner (R., S. D.) introduced legislation authorizing a War Department public works program estimated at \$255,000,000 for the 1948 fiscal year. It includes numerous additional AAF facilities.

William Van Dusen, former public relations director of Pan American Airways has organized his own firm to specialize in industrial and advertising consulting. His firm will be at 259 Park Ave., New York City, and in Washington.

FINANCIAL

TWA broke into the black for the first time this year during May with a profit of \$100,000, according to President LaMotte T. Coffey.

Mid-Continental Airlines reported net profit of \$6,712 and a 64.7 percent load factor in May against \$18,451 profit and a 75.1 percent load factor for the same month last year.

Consolidated Vultee Aircraft Corp. reported a net loss of \$768,287 for the six month period ending May 31, after an estimated credit of \$1,184,266 resulting from tax carry back provisions.

Bonair Aircraft Co. announced a \$18 a month salary increase for 3,000 nonunion office and supervisor employees effective July 1.

LOOK TO JANITROL FOR THE NEWEST IN HEATING



Janitrol's new burner assembly fits into the DCA. These are used for testing and engine servicing. The burner is easily and safely installed.

ALTHOUGH more than 50,000 Janitrol Whirling Flame Aircraft Heaters have proved their dependability under all flying conditions... research and development work here at Surface Combustion has not slackened.

Just as Janitrol engineers originated the fuel injection system and the adaptive spark ignition for aircraft heaters, so new advances are still being tested in the laboratories and in test flights to provide for even greater passenger comfort and safety.

The use of four Janitrols in the Douglas DC-6 for complete year

'round air conditioning and servicing of wing and empennage is a typical example of Janitrol's contribution to modern flying.

Janitrol Combustion-Type Heaters are available in several models ranging from 15,000 to over 500,000 Btu per hour output.

This wide experience in the design, installation and servicing of aircraft heaters and the complex facilities of our research laboratories can be made useful to you. Let us know your problem. Write Aircraft Heater Division, Surface Combustion Corporation, Toledo 1, Ohio.



This instrument enables Janitrol engineers to study engine on the basis of an engine map. The electrical characteristics of control devices.



Electrical temperature recorder is used to determine completeness of combustion and to accurately record output temperatures.



Through testing and inspection of Janitrol ready for shipment on specially built Janitrol motor-generator testing machine.

JANITROL

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Tennesssee Operators Use New Ground School Plan

Tennessee Flight Operations Association has developed a new type of ground school operation for the GA flight training programs designed to fit ground school time in half and now act problems which have been confounding flight operators throughout the country. Flight operators in Tennessee are showing up their new plans.

Approved by Veterans Administration and the Tennessee State Department of Education, the system is a house that starts with a text called "Graphic Flight." Graphic Flight is a series of seven books covering the ground school subjects in a new effective manner. Meteorology for instance, is taught "Morning Weather," and is supplemented by a three-dimensional device which shows about the map.

Under the old ground school program the course for private license required from 14-15 classroom hours, under the new, from 9-15 hours. A commercial license required from 10-11 hours. Classroom hours in the old system under the new, from 15-18. This system may be worked as a flexible manner in order to allow CAA's approval process to operate the house study course without losing their rating.

Robert Leffert, president of the Tennessee Flight Operations Association, developed the house study course and wrote the Graphic Flight series. The rate of "O" over per student hours in nine cities was insufficient for operators to secure credit, test material and necessary building facilities, and many students were dropped from the commercial ground school which they actually desired was a private license.



IDEALISTIC WHEEL TEST TOPPER
—First photo of new 40 ft. NACA helicopter test tower at Langley Field, Va. shows three blade Sikorsky H-6 rotor mounted on the tower. Motor-driven shaft will have rotor at large at 60 ft diameter. Top speed push ions, aerodynamics, flutter and vibration will be analyzed with the use of that new research facility. (Details on Page 31)

Phase-to-Ground Service

Phase-to-ground radio telephone service for true mobile purposes will be started in soon as CAA approval is obtained, American Overseas Airlines Ltd. The line has obtained an FCC license to transmit public messages from airfield planes to the ground. It used it was the first airline to apply for such a license. The new service will be provided on the North Atlantic routes available to transoceanic passengers for the short-term telephone. Messages can be sent on more

Airframe Forwarders Form Permanent Group

The Airframe Forwarders Association, created as a temporary organization last winter (Aviation News, Feb. 24), has been established as a permanent body and has moved to strengthen its ties with international airframe forwarders.

Meeting in Washington recently, AFA named a new staff of officers and appointed an executive committee to ask CAA for immediate issuance of temporary authority permitting selected independent airframe forwarders (not connected with surface interests) to operate as indirect owners overseas. AFA contends that CAA can determine which companies are qualified for the temporary authority from the record of the forwarders' international airframe forwarding history.

Representatives of four members of the Independent Airframe Association—Rick Airways, U. S. Airlines, California Eastern Airways and the Flying Tiger Line—met with the forwarders and issued them for their support. New AFA officers Allan Dean, president; North American Forwarders, Inc., president; A. N. Wiles, Air Express International, New York, first vice president; W. E. Thompson, Montreal, second vice president; Carg. Ltd., London, third vice president; P. W. Gaudin, Airborne Consultants, Cleveland territory; and P. A. Bonaldi, Peter A. Bonaldi Co., Philadelphia, treasurer.

British Planning New Trunk Services to Orient

(McGraw-Hill World News)

Middlesex-British experts are in Australia exchanging technical data with officials of the Commonwealth Department of Civil Aviation as a source of truth on route service between the U. K. and Japan and Australia.

The British Government hopes soon to extend its 8-10 hour service from Hong Kong to Tokyo, and B.O.A.C. hopes to start a new "South China Sea Coastal Route" that runs from Hong Kong to Manila, Borneo or Sumatra, Singapore, Bangkok, Hanoi and back to Hong Kong.

G. Wiering, head of the Overseas Airlines branch of the British Ministry of Civil Aviation, said the British Embassy in Tokyo probably will be issued for the North Atlantic route with Tudor II's used on the Australian route.

Autogiro Patents

Under a new licensing arrangement with the Autogiro Co. of America, United Aircraft Corp. agrees rights to use more than 200 Autogiro held patents in general production of its Sikorsky helicopters. The licensing agreement between the two companies covered only government procurement.

AAF Is Pondering New Bomber Rules

New heavy, long-range equipment calls for strategy re-evaluation.

Recent completion of the first phase of the B-36 at the Consolidated Vultee Plant, and the fact that 100 B-36's are coming off the line at a planned rate of one a week, is being accompanied by a complete AAF re-evaluation of the bombing strategy which proved so successful in World War II, but which also was heavy, very long range bomber makes obsolete when it goes into service.

On short range missions the average B-36 can carry 72,000 lbs. of bombs, but more important, it can carry 10,000 lbs. of bombs, or an atomic bomb for a strike 4,000 miles from home, with enough gas for a top hour.

Commanding Gen. Roger Ramey of the Eighth Air Force, which will be the first force to be equipped with a B-36, points out that the B-36 is already equipped with all atomic bomb groups, and that with B-36's to carry the atomic bombs, a separate division against an opponent will be made possible that would be "terrible to counter plans."

General Ramey forecasts the following line of bombing strategy with the advent of the B-36 to service:

► Need for advanced base with bulk amounts of waterborne supplies, and rapid loading airplanes using carrier forces with short range planes in enemy bases largely will be eliminated, since the long-range bombers can strike from the North Atlantic coast, anywhere as "that part of the world where aggressive spirit is needed."

► The new bombers will have enough range to make strikes by indirect approach, widely differing against zones of approach, so that supporting action supporting B-36's will be able to make a surprise attack, without need to second air force boundary, or shore approach task.

► With greatest power, B-36 top speed is quoted at over 300 mph at 30,000 ft. and it is estimated that use of subsonic engines in the B-36 would slow this speed to about 200 mph, with critical consequences for its structure. Successful fighter attacks would have to have 25 percent more speed, which would put them up in the critical combatability arena. Until new fighter fighters are evolved the faster bomber will be able to fight fighters than the World War II bomber.

► Delicate movement of the B-36 will be made right towards each with two 20 ton, mission plus high speed "pursuit" fighters carried by the bombers (McGraw-Hill World News) XP-55 previously described and described in Aviation News. These may



NEWEST CORSAIR

First photo of Vought F4U Corsair, now in production for Navy, only new advanced appearance change from production F4U-1 is two on intake pipe, no new leading edge of cowling, replacing single one at bottom of intake nacelle. Even new changes have been made on the engine, including completely new engine structure. Powered by new P & W R-2600-10 engine, turning new Hamilton Standard propeller, called a "turret," most powerful propeller drive single engine fighter in world.

get fighters will be dropped by the big planes at the rear of attack, and designed to be pulled up again by the smaller planes at the end of combat. The perimeter are needed because the new long range of the B-36 precluded the use of escort fighters.

► The AAF is not discounting the role of guided missiles and primary force in the next war. Radar control missions against such weapons must be considered. But General Ramey does not consider that the B-36 has been obliterated by "post-hoc war."

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► There is no place in the world that can't be bombed by the B-36 if suitable bombing technique is used.

► Value of the B-36 and other new bombers depends on their ability to operate when any nation first attacks us.

1,775, entry cargo, 900 light transports, 2,900 medium transports, 1,300, heavy transports, 475, primary transports, 11,015, heavy bombers, 8,676, advanced bombers, 4,775 WAA's copious plane stock now consists of about 625 C-46's, plus 200 DC-3's and DC-4's to learn to plan.

Airport Aid Offers Made to Nine Cities

CAA's Federal airport program, after getting off to a slow start with the first grant issued to San Francisco, Calif., a year ago, is now getting off to a fast start with the first grant issued to nine cities, and now ready to go with a batch more.

Larger offer yet at Chicago \$870,000 for the Class I downtown airport on North LaSalle. The city will get up an equal amount. CAA stated the high cost of a new field at the end of the field, and the cost of building a new terminal to connect the field.

Other projects in which CAA has offered grants are:

- Baton, La.—Federal, \$1,250, sponsor, \$1,750 airport land, Class II.
- Camden, N. J.—Federal, \$15,000, sponsor, \$24,000, airport land, contract Class II field.
- Phoenix, Ariz.—Federal, \$75,000, sponsor, \$75,000, post terminal, terminal, airport, contract administration building, Class II.
- Canton, Mass.—Federal, \$122,000, sponsor, \$171,000, contract Class II field.
- Hialeah, Fla.—Federal, \$225,000, sponsor, \$300,000, airport administration building and other work, Class II field.
- Hialeah, Fla.—Federal, \$75,000, sponsor, \$75,000, airport land, contract Class II field with two trips.
- Annapolis, Md.—Federal, \$60,000, sponsor, \$52,140, airport land, airport Class I field to Class II.



C-54 SPECIAL PLANESPLANE

CAA approval has not been obtained on European version of new C-54. From C-54 Special Planesplane equipped with Kilo Model 1400 aircraft engine. Features: rear of two-plane fuselage, with McCulloch axial propeller includes a 500-hp rate of climb, 10,000 ft. top speed and 10,000 ft. climb speed. Tests showed plane performs as a 40-sec. climb rate with 1500 lb. gross weight. Plans are of new simplified H-6 design with retractable wheel gear, pulled down bays, and other features for simplified field maintenance.

Continental Motors Corp. elected Thane Engstrom vicepresident and factory manager of the Madison Division. He steps up from acting factory manager, after a 27-year career with Continental.

► **Stewart-Warner Corp.** announced resignation of **Lynn A. Wilkins, Jr.**, as vice president in charge of the South Wind Division, manufacturer of aircraft heating systems. E. A. Hirt, senior vice president, takes over supervision of the Division in addition to his other duties.

► **Republic Aviation Corp.** named Deborah Miller Seiber, factory representative for the West Coast. Her aviation background includes affiliation with Beech Aircraft as avionics line pilot and with Taylorcraft as factory representative. She moved as a Navy fighter pilot during the war.

► **Curtis-Wright Corp.'s** Airplane Division at Columbus appointed J. E. Wuerstner to the engineering sales staff. He formerly was chief engineer of Slick Air Lines.

► Pacific Division, Boulder Aviation Corp. named R. C. Fuller assistant general manager, succeeding Mel Burns who resigned. Fuller has been general manager of Boulder West Coast. He formerly was sales manager of Pacific Division.

► Aluminum Co. of America announced its statement of George J. Stanley, vice president and general sales manager. He will be succeeded by Ralph V. Brown, who has been an assistant general sales manager and who now will be a vice president. Two other assistant general sales managers, Robert E. McKee and Douglas Whitson, have also been promoted to vice president.

► Boeing Aircraft Co. named Norman Allen as assistant to the president to succeed O. W. Tappan, who has resigned. Allen, an assistant to Boeing's president, William M. Allen, has been office manager of the aerospace division.

Sherman Fairchild & Associates appointed Martin V. Kiebert, Jr., a member of the firm. A radio and communications engineer, Kiebert will be a consultant; he expects to assist telecasting, entertainment studios, radio stations, record companies and record control.

Marking the first time in the nation that an aerial attack will replace large crews in a high fire danger area, one of plans for forest fire detection work on the Comstock National Forest in Idaho will be inaugurated this summer, reflecting about two-thirds the number of lookouts generally used during the fire season. The air unit will give the first 100 percent coverage compared to 90 percent previously.

Off-the-shelf purchases by the U. S. Army of two and four-place civilian planes for Army Ground Force uses of liaison, communications and personnel transport, awarded in two contracts:

Annova Aircraft Corp., Middlefield, Ohio, for 499 two-place Champans, standard except for Plexiglas and 51-hp. fuel injection Continental engine, \$1,649 per plane plus 10% spare parts and technical information.

Nervous are standard except for valve installation, pitonable door and a few minor installations.

Both phases were demonstrated at Ft. Rugg, N.C., in competition with other "stock model" lightplanes in rough field landings and tight-radius maneuvering conditions. Pilots were chosen on a basis of lowest bids of planes meeting the minimum requirements.

A program planned to liquidate all remaining surplus aircraft components by July 1948 with the 75 agents in the industry playing a major part has been announced by War Assets Administration. Tentative target dates of Sept. 1 and Dec. 1 have been set for closing the sales-storage depots at Torrance, Cal., and Cleveland, respectively.

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Refi Averbach's special animal helicopter, apparently an adaptation of the Model 42 with most compartments on both sides of the fuselage. Each compartment holds five small bags and capacity of the two together is about 500 lb. of mail. The "Averbach," as Refi calls the new model, comes with one or no rotor cover.

no available, aircraft components originally costing \$187,388,600 had been sold for \$61,946,000, with agents accounting for material with an original cost of \$66,317,716. This leaves as stock components that cost the government \$775,320,000.

Investments now in the hands of WAA agents will be screened, beginning immediately, and material segregated into three categories as scrap, slow moving or double hit items, and valuable merchandise. Agents will be directed to sell the material in the first two categories at once under competitive bids, with supervision exercised by the regional chiefs of WAA's Aircraft and Electronics Division.

The balance of the inventory, valued at a variable, will be allowed to the agent as cash. He can either obtain outside financing, or WAA will extend credit over a period not exceeding three years. If the agent turns down the offer, the inventory will be disposed of by constructive bid.

WAA's printed assumption with agents is to ship merchandise as consignment, with the government paying shipping costs. It is expected that by Oct. 1, agents will have inspected all surplus astronomical materials and filed their requisitions with WAA. Agents flag requisitions after Oct. 1 will pay shipping costs on the material. Under present plans, WAA will stop making allocations to agents on Jan. 1, 1946.

John H. Carey, WAA deputy administrator for aircraft and electronics disposal said that if the speed-up policies and procedures are followed without major deviations, WAA "will be mostly out of the aircraft components parts business before July 1, 1995."

Jet expect claims eventual
airline replacement of piston
engine.

At least five years will elapse before British prototype turbo-powered jets will fly the air routes. F. R. Banks, well known engine authority, told a meeting convened in New York.

A wartime air commandeer and director of engine development, now director of Power Jets (R & D) Ltd., Rankin outlines the British viewpoint on future rocket propulsion before a joint meeting of the Society of Automotive Engineers, Institute of the Aeronautical Sciences, and American Society of Mechanical Engineers.

✶ **Piston Engine End Forecast—Holds** that even after this five year period, no additional years will be required to attract the sufficient numbers of turbine-driven craft and operating experience, but as diesel interest is that the termination of the overall period—about ten years hence—will mark the end of the high duty reciprocating engine, continue.

All future British plane projects—except for some small feeder or twin types—will have turbojet or turboprop installations. Since no new piston engines are expected to be built by British manufacturers, ruled out is the possibility of developing composite installations to attain increased power/fuel economy.

Any turbine-powered commercial aircraft, trans-Atlantic or even inter-continental, before the lapse of five years will as a probability be purely experimental, without

► **Techsupport.** Jet Users—Although techsupport includes adoption of technet products for both military and commercial craft, Bristle disclosed that the techsupport being developed mainly for military application. At present, more techsupport techsupport units are coming off Bristle's production line.

Contrary to the popular conception that he declared that this type of power would be used in that well as in any other field, for example,

several intercity airline operations. Dual frequency could be realized by having present block-to-block times as close as possible to the 10-minute mark, and then designating each corresponding round-trip weight saving. Ranges as much as 3.0 mi (4,600 in still air) are not feasible in jet planes, and turboprops probably will be used for this purpose, although there are many under development in England.

United Aircraft Corp. has organized a subsidiary, United Aircraft Export Corp., to handle foreign sales of all from United divisions, Pratt & Whitney, Hamilton Standard, Chance Vought and Sikorsky. The Export organization began operations last week with the discontinuance of United's export department.

Joseph M. Barr, who has been man-
ager of the Export Department since
1941, has been elected president of the
new corporation. Vice-president is
K. Hubbard II, treasurer is James
O'Brien, secretary is Paul Barker,
and officers of the corporation will
at the parent company's offices in
New York.

It is believed that propeller efficiency of 80 percent up to 510 mph speed can be attained in prop-inboard configuration.

Overhead Periods Lengthened—Friction of some British military tailfins in overhead periods to be stretched 10% to 15%, with only an interesting reduction of the combustion chamber stay at the 120 lb mark. The 140 lb increment is attributed largely to owing to the combustion chamber, the long earlier tailfins associated by blade" caused by irregular burning

is felt that at least 700 h (before one should be attained) before conversion sequence is considered feasible.

ing Problems—Elimination of hazardous passengers will be an important part of very high speed commercial aircraft flight, Banks said, even at 4000 "knots" (one knot is one nautical mile per hour). The problem is far from

so, angle of descent at high speed could increasingly be flat, unless some other means were employed. Pilot would start descent at a very low rate, as he had reached altitude—imperfect first trip. Second pass to deliver stream in right direction very precise slide path.

and FuelCell) is expected to be 17 years before jet cash will start to flow at speeds approximating those of the 650 mph at sea level. Fossil fuels and airport facilities probably will be refined before that high speed is feasible.

Research remains to be done also in the use of fuel for congested harbor

McGraw-Hill World News

Landing.—Three new versions of the Hawk Mosquito and two new variants of the Hawk jet have been developed by De Havilland Aircraft Co. Ltd.

The Mustang, one of a very few types of British warplanes still being made, has nine flow-over variants. The Mark 17 Sea Mustang replaces the Mark 15, which was the last two-engine aircraft to operate regularly from carriers, and has a new type of radar scanner in its nose. So too the new Mark 16 night fighter. Both show performance of their predecessors.

A deperture is the black 18, adapted to target testing, which carries a copy of the list for its specialized function. Border tones target the plane can be operated to a light target, at which other gamut may find with a continuous list with rights which he been given a fixed definition. The last are recorded on film by a continuous series in the extended transparent zone of the target itself.

The two new Hornets are the Mark long-range fighter, which has been given greater fuel capacity than the Mark 1, and the Mark 28 night fighter Sea Hornet, whose nosepoints a sensor radcope for a navigator radar operator behind the pilot's. This plane can be used alternately for reconnaissance or for strike missions as leader of a formation of night-strike Hornets.

The price of the De Havilland Fox Mo made by De Havilland Aircraft of Canada has been reduced \$2,800 to \$14,450 as a result of improved manufacturing efficiency. The company reports that the Fox Mo airplane can now be changed over to produce in 24 hours rather than 25, a result of the stock of Roys.

Canada's 13 percent border tax has been removed from air services to those remote parts of the Dominion which have no practical means of surface transportation. The exemption is designed primarily to encourage men and others travelling on boats to the sparsely settled northern areas.

posed craft. Less volatile fuels than the present military types will be desired for safety considerations. Presently available "ice flammable" fuel of bromine at about 1 deg. C., whereas for commercial operation a burning temperature of about minus 40 deg. C. would be required.

NACA Reveals New Results Of Supersonic Research Program

First full year effort on basic high speed problems indicates new design concepts and construction methods necessary; flight tests to begin in July.

By ROBERT HOTZ

The shape of supersonic things to come is now more defined as a result of scientific research data gathered in the first full year of basic high speed research by the National Advisory Committee for Aeronautics. NACA's efforts to basic research in supersonic flight marks a clean break with its wartime policy of concentrating on improving design and tactical type aircraft directly in existence.

Expenditures of the fundamental research program as authorized by the \$12,000,000 in excess of NACA's 1948 budget by an economy minded Congress that has drastically slashed funds for virtually every other government agency seeking an appropriation. NACA will get \$41,449,000 for 1949, the bulk of which will be spent on supersonic research. The fiscal year just concluded saw NACA spend \$10,713,000 primarily on the research program that has yielded the first subsonic data on the critical transonic range.

■ **Early Estimates**—Although NACA and the United States made a study estimate of the supersonic research cost, there is evidence that in the last year some of the other competitors have been unable to enter the NACA race.

Facilities now under construction indicate that this gap may be widened considerably during the coming year. Although the joint AAF-Navy, NACA, JROB plan for a billion dollar supersonic research center has been shelved in view of the civil engineers' work blowing from Capitol Hill, work is well underway on a \$45 million supersonic tunnel at Cleveland, a \$40 supersonic tunnel at Langley and another \$40 million five foot supersonic tunnel at Ames. The 16 ft. wind tunnel at Langley is being stepped up to 60,000 hp to bring it up to transonic speeds.

■ **New Tests to Begin**—The NACA supersonic research has been conducted by three methods—wind tunnels, including a first flight tunnel filled with kerosene gas that permits speeds up to Mach 4, rocket powered remotely controlled free flight scale models and wing flow tests in which models are mounted at the point of interest as flow on F-105 so that they experience transonic air flow while the aircraft to which they are attached is still flying at subsonic speeds. A fourth, method—flight tests of full scale piloted research aircraft—will begin this month.

Indications are strong that some form of

sweep back wings will be required to negate the induced reaction of the transonic range. Indications are equally strong that once transonic control and stability problems are well in hand there will be a move to straight edge wings on aircraft designed primarily for supersonic speeds. Although the bulk of NACA wind tunnel and flight research has been concerned with characteristics of swept back wings, the A-108 wing and other thin, straight edge types are now under investigation at supersonic speeds.

■ **Wing Plan Problems**—Design problems with wing plan forms seems to be the first that supersonic aircraft will have to be able to negotiate and transonic range before and after it enters at supersonic speeds. Initial effort is now being devoted to re-examining lift and stall characteristics at various types of wings that have demonstrated efficiency at high speeds but lack stability and make control difficult at subsonic speeds required for take-off and landing. Application of boundary layer air flow control through suction slots in the wings and use of various types of leading edge wing fences and configurations of wing slots, vortices and spoilers are being investigated to improve low speed life of high speed wings.

All possible wing plans have been months ago. The maximum degrees of sweepback up to 95 percent; sweep forward, combinations of forward and backward sweep on the same aircraft; triangular Delta wings and the tapered shapes of the A-108 type wing. Preliminary conclusions indicated better low speed performance from swept forward wings but that plan form was discarded when it became apparent that the high speed problems of swept forward wings would be more difficult than the low speed problems of swept back wings.

Delta wings with sweepback of less than

Teaming up on TIMKEN BEARINGS

Showing the latest technique in amphibious assault is the XH-40 helicopter built by the Fieschi Helicopters Corporation, Sharon Hill, Pa., as it flies a "jeep" made by Willy-Overland Motors, Inc. of Toledo, O., vertically and carries it to a predetermined destination.

Nicknamed "The Flying Work Horse", this aircraft can cruise at a good 100 miles an hour carrying a load of more than a ton.

To help achieve this remarkable performance, 32 Timken Tapered Roller Bearings were installed in the main and aft transmissions, rotor blades, main rotor shaft and landing wheels, where they provide the extra strength and power and carry

all the radial, thrust and combined loads imposed upon them under all takeoff, flight and landing conditions.

The "jeep", of course, has long been equipped with Timken Bearings, using 22 of them in the front and rear axles and the transfer case.

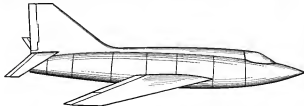
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FIRST ILLUSTRATION OF BELL'S XS-2 TRANSONIC RESEARCH PLANE

Designed to explore stability and control problems between Mach numbers .85 and 1.1, craft has theoretical speed range up to Mach 2.5. Differing radically from XS-1, first high speed research craft, XS-2 has sweepback wings with negative dihedral, circular air foil, and sweepback tail surfaces. Like XS-1, it is rocket powered.

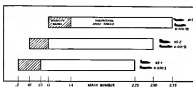
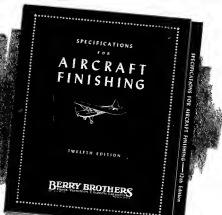
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NACA's M-PHASE FLIGHT RESEARCH PROGRAM

Chart showing how NACA flight research program is planned to explore transonic flow to acquire stability and control data necessary for supersonic flight. Research will be conducted in three phases with two types of aircraft, one with natural power, the other with turbojet power. Range of each part of research plans will overlap to insure complete coverage of transonic zone where stability and control are critical problems.

65 degrees exhibited good high speed flight characteristics but with 65 to 55 degree sweepback, some stability developed. At 55 degree of sweepback the model, which looks very much like the British gun airplane that introduced bank, rolled over and over. Although the Germans did considerable work with Delta wings they were never able to control them in flight in landing and take-off. NACA has successfully flown and controlled a model with 65 degree sweepback and aspect ratio of two in its free flight tested at Langley Field. Landing tests and take-offs are made at a 50 degree angle.

► **Sweepback Effects**—Other effects of swept back wings include alleviation of gust loads by 40 percent with a 45 degree sweepback, an important factor in design of high speed transports, better spin recovery, and a had tendency toward tip stall. Spinning characteristics of high speed aircraft were previously had in three general forms due to the fact that the bulk of the aircraft load must be carried along the wings. High speed wings are too thin to carry load and cause most loads in this case are concentrated along the span. Some tests on high speed jet fighters from the P-50 through XF-108 revealed no static type characteristics with the NF10 handling rate on control span after several runs.

The tip stall problem is being attacked by experiments with small scales on the leading edge of wings to block the formation of the boundary layer on. Increased stability has been obtained by adding the wings at a 5 degree angle below the normal flight angle of the aircraft.

► **Wing Types**—Three types of airfoils have been made various shapes at the high speed research program. One is NACA's own high speed airfoil series. The other two are the double wedge airfoil and the circular arc. The circular arc is a modification of the diamond shaped airfoil in which both upper and lower surfaces of the airfoil are made segments of an arc of the same circle. The Bell XS-2 will use a circular arc airfoil. It was originally planned to give the double wedge airfoil its initial flight test on the Douglas XS-3.

Experiments with various types of swept back airfoils have indicated that there is a limit, large at present for these types of propellers to equal the efficiency of jet propellers above 500 mph. A second more difficult to get an airfoil on high speed aircraft has been developed to maintain balance from shock waves on the airfoil. This type of airfoil is particularly good for military aircraft since it permits mounting of guns and other equipment in the nose deflector.

► **Flight Tests**—The aircraft flight test program, which began with a pair of specially modified Bell P-59's with swept back wings exploring landing and take-off problems of this type wing, will begin evaluation of the transonic flow in piloted aircraft this month as NACA takes delivery on the XS-1. AAF contract with Bell Aircraft Corp. to do high speed testing of the XS-1 will be pending but indications are that AAF probably will do the testing with suitable pilots to serve as test pilots. Flight test program will be conducted in three phases with one XS-2 model and one D-155 type in each phase.

NACA technicians are flying the XS-1 aircraft in a program to determine the D-155 Mark II will be added for acceptance tests by Douglas test pilot Gene M. Landing gear performance is still not completely satisfactory.

► **Lower Wings**—First phase to be done by the XS-1 and the D-155 Mark I will replace the lower wings of the transonic flow Phase One results on the Bell XS-2 and the D-155 Mark II both with swept back wings and lower aspect ratios than first phase planes. Douglas will build both shell phase planes—the D-155 Mark II which will be used primarily for aspect ratio studies and the XS-1 for which a design contract was given to Douglas last week.

Phase Two will explore through the transonic zone into the longer of the supersonic flow Phase Three will be primarily supersonic. The Northrop XS-8 is designed principally to explore characteristics of tailless aircraft at high subsonic speeds. According to Nelson Ames, NACA, Co. chairman of Ames Research, the NACA flight test program for Phase One will take at least six months.

Helicopter Testing Towers Stress Blades

NACA and British research facilities offer hope for new study in rotary wing research.

Rapid strides in helicopter design and development progress may be made possible by general helicopter testing towers now being perfected in both the U. S. and England.

Although the two towers now under way in progress and detail design, they are built on similar principles. Both will permit the testing of helicopter rotors out of range of "ground effect," which, because of the air moving down through the rotor and re-bouncing from the earth, produces a non-linear surface pattern. Their patterns provide exact data obtained in actual helicopter flight tests.

► **Langley Tower**—The U. S. tower was designed and built by the National Advisory Committee for Aeronautics at its Langley, Va., laboratory to perform fundamental research on helicopter rotor aerodynamics in order to simplify complex mathematical theories previously employed.

The tower, recently taken off the top secret list, has been in operation since October 1946. It made 90 ft high and is powered by a 1500 hp Ford engine mounted parallel to the rotor at 50 to 400 rpm, will show and below normal operating range of conventional helicopters.

The drive shaft is constructed to provide data on thrust, torque, take down, pitch angle, rotor pitch, drag angle, rotor angle and vibration.

► **The Winds**—The tower is located in a three story permitting the use of ground winds of up to 20 mph in a spiral around axis of rotation. A special research use of the tower is the measurement of lift and the power required to lift a rotor at high tip speeds and angles of attack now stilling, which cannot be safely increased in flight tests of full rotors.

The British tower is being built by the Bristol Aeroplane Co. as an experimental and development unit for the testing of specific rotor designs for proposed British helicopters. As such it is far less elaborate than the U. S. tower. The Bristol tower is 10 ft high and is powered by 300-hp d. c. drive motor capable of producing 1000 hp at a motor speed of 1000 rpm. To permit the rotor to be disassembled to destruction, the tower is surrounded by a heavy tapered safety net set apart by more than 10 ft.

The tower is flexible mounted and supported by air gun supports isolated into one corner foundation.

► **Tower Oscillation**—Purpose of this system is to support to the rotor the same highly oscillatory conditions found in present helicopters, thereby providing a more accurate set of test conditions during open tests of the tower. Shaking of the rotor will permit the tower to simulate a horizontal motion with one of three frequencies, most of which must be dampened by test and extreme manipulation of the various rotor tensions.

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Admiral Rosendahl Heads Airship Study

\$70,000,000 sought for operation of seven giant dirigibles on overseas passenger route.

By BEAENE STUBBLEFIELD

There is a chance the U. S. will see commercial rigid airships while the rest of the world, from Germany to the Soviet Union, fights it. Commanding a new drive to create and manufacture by the Navy, but not the lighter-than-air as a divisible as possible between fast airplanes and slow surface ships.

There were for the side from the outset (1) Research development of rigid airships which, among other things, are lowering in North Pole regions; (2) A report by the Air Consulting Committee which stated that the cost of the engineering and technical foundation for the construction of airships and their lighter-than-air craft; (3) Command Airship Corporation is already reporting that, though it declines to be released with any promises.

The Rosendahl group is looking for a foreign company.

First, it has acquired some private capital which is financing a series of tests of technical and economic feasibility and risks. If the study is favorable, the capital will back a project and hope for government assistance.

The group's estimate is to build 50,000,000 the nominal construction and operation of seven 10,000,000 cu ft rigid airships, possibly on an overseas route.

Second, the Navy approved the first draft of construction and operating regulations of the Maritime Commission, with the hope that the construction act of Congress will authorize a study program for lighter-than-air along with surface ships.

The Maritime Commission Act of 1916 directed the Commission to report on such subjects for airplanes and airships. Greater Learning made the study, reported favorable, and Congress has passed it.

Third, the Rosendahl group hopes to persuade some companies to set up a pilot operation with Navy K-type rigid airships, which are over 20 percent lighter than air, depending on modifications, which would give the public and Congress a sample of an "airship" and might lead to larger operations. Along the way, they need 400,000 passengers without an open-a perfect safety record.

If So-Air Corporation's drive for the right to use aircraft later, it is a very likely, the shipyard, too, give some attention to dirigibles. Some observers feel that Cals would not, unless they lighter-than-air ships, since the airlines have turned up the opportunity. CAB could be deprived of jurisdiction by an act of Congress authorizing airships under the Maritime Commission. Congress could establish a separate lighter-than-air commission, which the airships would be left better.

Report from Data-The 15 year AGC report contains many indicated and economic facts on the whole subject.

Industry Observer

► McDonnell Aircraft's parasite fighter-NP-55—will be dropped with its wings folded from a B-50 bomb bay. Wings are supposed to unfold as the parasite falls clear of the mother plane. Recovery will be effected in the air by present dirigible technique. Mother planes will carry a combination of up to three parasite fighters and variable bomb loads.

► New version of the British Nene jet engine will develop 3,550 lb. static thrust but U. S. engine manufacturers are not worried because domestic jets tapping that power output are already in advanced stage of development.

► General's P-5F, which will be powered by an earlier version of the Nene to be manufactured in this country by Pratt & Whitney, is nearing flight test stage. Pratt P-5F's, however, will be powered with imported engines.

► Navy is having some armament trouble with its first operational jet fighter—the McDonnell F2H-1—that bothered the AAF with early P-50's. Forward bulkheads have to be materially strengthened to avoid popping seats when guns are fired.

► Control of guided missiles over long ranges between launching region and targets is the subject of intense research now under way by path finding warfare experts. Most promising lead seems to be automatic, reflexive navigation that guides the missile through automatic from on predetermined celestial bodies.

► Observers who follow the trend of fighter lines closely wonder if the death of suitable planes for short haul operations may not stimulate Douglas to move its present DC-5 for service as a feeder liner.

► Both TWA and Lockheed are reported to be unhappy about the \$770,000 bill demand met filed by the airline against the manufacturer as a result of the Conquest crash last summer at Reading, Pa. Strong indication is that TWA would not have filed suit without heavy pressure from its insurance agency, Aerm Underwriters, which made original payment for hull loss damages. As a test case, the suit will require submission of any damages that may be won by Aerm Underwriters. TWA's original claim against Lockheed for consequential damages covering loss of income during that Conquest was grounded by CAB, was dropped during negotiations for cancellation of 18 model 649 Conquest last winter.

► When and if Messerschmitt's giant new subsonic engine is perfected and made available commercially, Lockheed Aircraft Corp. will have a corner on its initial production. Lockheed holds an option for the first 250 engines Messerschmitt produces which may give the Burbank firm a head start in the jet transport race. Lockheed management has indicated it will not absorb Messerschmitt.

► Howard Hughes paid tribute to the California weather by ordering erection of a 77,000 sq. ft. fireproof canyon tent over the Hughes flying boat at Long Beach harbor. It will be supported by a framework of 34 tons of tubular steel. Boat will not be landed before seasonal investigations headed by Michigan's Henry Henshaw on the West Coast, July 16 to probe Hughes' wartime activities, including his flying boat development contract.

► Australian government has voted \$5,335,000 for production of jet bombers by General Electric Aircraft Co. in Melbourne. The firm will make Rolls-Royce Nimrod under license.

► Aircraft designers will be watching closely results of new University of California research on efficiency of joints in pressurized portions. One hundred students, all former AGC and Navy pilots, are using in glass pipe in the experiments which will probably require two years for completion.

► Costs of NACA wind tunnel test models has skyrocketed from an average of \$2,500 in 1948 to \$20,000. Annual average today now costs about \$747 per hr. as contrast to \$16 in 1939 and \$225 in 1943.

► A flat surfaced "inflat window" will replace the aluminum in the Boeing Stearman. Inflatable window is designed to withstand more stress than the bubble type design, free of which there are no complications on pneumatic canopy while using the cable pressurization system.

► Joint Army-Navy Board is conducting studies to discover the United States industrial bottlenecks most vulnerable to air attack.

Beech Releases Details and Photos of Feederliner

Beech Aircraft Corp. test work scheduled as early test flight for its compact Model 34 transport, designed to fit the purpose of allowing local service either by provision for change-over from passenger to cargo space to a matter of minutes.

► Estimated Performance—Using the plane, Beech is setting an estimated performance and some other details, except for takeoff distance—a strong selling point to local service operators. Preliminary estimates indicate it will take off, in accord with CAA regulations with one engine dead and clear a 50-ft obstacle within 2,600 ft at sea level. At an elevation of 3,000 ft., the distance would be 3,100 ft. Although designed in a short field corner, the Model 34 has full capacity for a maximum range of 3,400 mi., with a 45-min. cruise.

Model 34 is a high-wing monoplane with a modified V tail. The angle of the two surfaces on the transport is more acute than that of the tail of the Beech Bonanza, the low plane plane which made the first evolution of the design concept. The new design also introduces features new to U. S. transports. The engines are housed, with four engines driving two propellers.

► Licensing Engine—Beech is licensing the Bonanza on the basis of using Lycoming 540 engines, although recently it has started testing an underlicensed Continental model. The Lycoming engine is currently rated at 512 hp, but develops up to 775 hp at 3,400 rpm for takeoff.

Fully supercharged, the Lycoming is a flat eight-cylinder engine which fits into the wing.

The engine is arranged in pairs, driving the propellers through gears.

► Seating Plan—On the left-hand side of the cabin, looking forward, is a single row of three seats. On the right-hand side, with no entrance door taking up space, there is a double row of five seats. At the front of the cabin, along each side, are seats for six seats (passengers), three on each side. Forward of these seats, behind a bulkhead, is the cargo compartment.

Cargo compartment can be released as needed by moving a seat at a time from cabin into. The bulkhead, complete with entrance door, is movable, so the cargo compartment can be expanded and hidden from the passenger's view in any one of the various adjustments. After closing the cargo compartment, the system of the airplane looks the same as before.

► Folding Seats—Most secret of Beech's variable seating are the seats. Beech company says they realize that the seats might be needed at a subsequent stop, so they must be stored in the airplane of all times. Therefore, they are arranged to fold up out of the way, with their foot legs snapped into lockers on the ceiling of the cargo compartment. The folding operation for each pair of seats, it is claimed, takes about one min. Moving the bulkhead requires two additional men. All of this, according to Beech, can be done by one attendant. In five min., the company says, the entire forward space occupied by the six seats can be converted for cargo use.



Scale Model, Beech 34



With Cargo Bulkhead Forward, 20 Seats



Cargo Bulkhead Moved Aft; 14 Seats. Note Baggage Lockers



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AVIATION WEEK, July 7, 1947



Two-place experimental United Helicopter Inc. craft shown with company's head, Stanley Hiller, Jr.

Hiller Simplifies Design To Cut 'Copter Production Costs

New approach to simplified design to facilitate both production and maintenance are revealed in these exclusive AVIATION WEEK design detail photos of the United Helicopter, Inc. Comanche.

Many of these features will be incorporated in production models of the Comanche, Stanley Hiller, youthful head of the company told AVIATION WEEK. This rapid changes, he expects, will be in a new

control system now under development. Meanwhile, these aircraft embodying the principles shown here are undergoing flight testing.

(This article continued on page 56)



To gain access to engine assembly, two bolts are removed from within pilot cabin and engine not once removed in test. This operation can be completed within one minute.



Maximum visibility was sought by Stanley Hiller, Jr. in designing Comanche rotor. Now, hillside is all luxury. Hillside having built optical distortion. Stress members are carried under rotor.

AVIATION WEEK, July 7, 1947

PRODUCTION ENGINEERING

29

Newest craft of young inventor includes features aimed at getting retail sales price down and keeping maintenance charges in line.



Close appearance and simplified design are accomplished by instrument "pocket" (left) in which single coil incorporates electronic of temperature and pressure, fuel quantity and fuel pressure, and instruments readings. Closing (right) showing engine with cooling fan installed. Fan operates on downdraft



principle, drawing air through ducts in forward area of nose heat sensing stop discharge. Transmission gear will be installed on tubular structure just aft of seat, being secured by four bolts. Engine and radio control cables are gathered in one ducts over fuel tank and are readily accessible for maintenance.



Before and after—in more ways than one. At left is shown first copies built by Hiller to test coastal radio blower. Based on flight tests with this craft features development was carried



on, resulting in present craft shown at right. Though advanced in many respects from prototype, further design modifications work is in progress before large scale production is undertaken.

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Available in 3, 4 or 5 m widths, with the 3

Available in 3, 5 or 7 gang units, the fast working Windinggates Fairway gang mowers manage golf lawns and other large grass areas with a minimum of labour time and cost. Individual gang units may be quickly added or withdrawn, and the gang can be made of 1 or 2 of any type of wheel tractor.

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The Range attachment consists of a Working area Glass Blower type triple gate, motorway with its own hydraulic, open and closed, wheels. A clutch of the control lever and the motor gate moves in lift and the automatic wheels are down. Its 7 low carrying wheels (1×10^6 units) makes quick work of carrying jobs at parks, cemeteries, streets, construction and highways.

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Better Air and Ground Handling Attained in North American XFJ-1

Navj's trim jet fighter has spring-released non-fouling wingtip tanks, also low-swirl dive brakes, and handy kneeling gear to ease positioning, stowage.

Designed for the fast pace of Marine Air Force as its "ambush-and-release" wingtip tank (left) is North America's 150th prototype XFJ-1 Navy jet fighter (top). Features of the installation is a method of positioning. When attachment lugs are released, a spring operator to push the tank away from the wing, the released "kneeling" action to pull it out of the flight path. Upper and lower fins on the tank's shroud serve to stabilize separation from the wingtip, thus preventing the tank's nose from whipping round and striking ahead.

To insure that application of the XFJ-1's dive brakes will not cause large loads or shifting in tail buffeting, the perforated units seen at lower left are employed, creating only small vortices. Although conspicuous, the wide leading surface is effective, the perforated configuration is effective, since drag does not increase proportionately with decrease in area of surface presented.

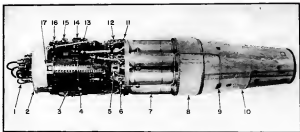
For easier ground handling and closer stacking on carrier deck or in the hangar, the XFJ-1 is equipped with kneeling nose gear (lower right). Two telescopic eyes

are attached to the nose wheel strut are employed to raise or lower the nose gear independently of the main gear. A lock-gear engages the cylinders and the landing gear control handle is set at neutral. With the fully extended nose strut, a control valve in the landing gear compartment forward of the wing leading edge is set for kneeling. Hydraulic hand pump, also located in the compartment, is operated to lower the nose of the craft until the gear is completely retracted and the dolly rests on the ground, taking the weight of the craft.

To raise the nose, the control valve is set at retracting position and landing gear control handle placed in the down position. Operation of the hand pump then fully retracts and locks the nose gear for normal usage.

The craft is powered by an Allison Model General Electric TG-180 turbojet (analyzed elsewhere in this article), and has very thin laminar flow wings, the fuel tanks being housed in the fuselage. (Photos at top and lower left by A. D. Schmidt.)





LEFT SIDE VIEW of TG-180: (1) engine accessories, (2) forward air guide, (3) flow divider, (4) gearbox transformer, (5) horizontal mean mounting transmission connection, (6) combustion chamber, (7) turbine casing assembly, (8) turbine

wheel casing air flow, (9) exhaust cone assembly, (11) engine forward buffer, (12) midframe, (13) thrust balancing piston bar, (14) bearing casing air flow, (15) electrical power base, (16) forward frame, and (17) horizontal forward mounting transmission.

Design Analysis of The General Electric TG-180 Turbojet

Revealed here for the first time are engineering details of the most widely specified American jet power plant—data prepared exclusively for AVIATION WEEK by a top designer closely connected with the development project.

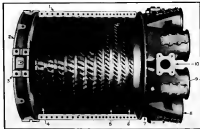
By NEIL BURGESS

Aviation Gas Turbine Engineering Div.,
General Electric Co.

Most extensively adopted American turbojet today is General Electric's and Ray TG-450 (J35). Installed in a wide variety of the latest military combat-bombers, fighters, a transport aircraft plane, and other types of jet propelled—other jet plane evidence in exceptional degree of design achievement, displaying a notable assortment of various piping and galleries.

Development of the TG-180 was initiated by GE in May, 1941, at request of the AAF Air Materiel Command. First test flight with this turbojet was in Republic's XP-54 in Feb. '46. Several engine models are being produced, differing principally in major installation requirements of the various units in which employed (Comet X-46, Douglas X-43 and D-55A, North American X-47 and X-48 45, Martin X-48 46, Northrop X-49, and F-84).

► **Air Flow Compressor**—The compressor consists of eleven blades/blade disk as a (Continued on page 39)



COMPRESSION ASSEMBLY with upper half of casing removed. Details are: (1) Compressor casing, lower half, (2) forward frame, (3) mounting transmission, (4) first stage rotor disk, (5) rotor blade, (6) clockwise stage rotor disk, (7) midframe, (8) combustion chamber opening, (9) for fuel nozzle opening, and (10) main mounting transmission.

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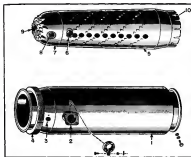
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TYPICAL COMBUSTION CHAMBER. (1) outer chamber, (2) outer cone ignition tube assembly, (3) igniter plug flange, (4) expansion bellows—internal on next assembly, (5) combustion liner, (6) ferrule for cross-ignition tube, (7) liner dome, (8) igniter plug ferrule, (9) fuel nozzle ferrule, and (10) liner support beam.

steel shaft and enclosed in a cast aluminum outer casing. First two disks, housing first two stages, are machined from aluminum forgings, eleven disks—last compressor stage—is a heat-treated steel forging directly linked by a splined fit to the turbine shaft.

Compressor rotor blades, forged and ground to run, are attached to disk rims with tapered disc dovetails. The disks are connected by cylindrical aluminum spacer rings shrunk under the rim shoulders, and each disk is secured in an abutting spacer ring by steel pins to ease the fitting task.

Compressor casing (stator) is horizontally split into halves, bolted together around rotor and secured at the ends by the cast aluminum alloy forward frame and tail frame. These frames are the main mounting structure of the unit, and, under compressor casing, are not split. Stator blades, also forged and ground to run, are dovetail mated into split rings, in turn assembled into the stator halves. Eleven rows of stationary blades are used, followed by two rows of fuel straightening vanes. Airframe drive casing is bolted to the forward frame,

which also acts as a bearing support for the front (No. 1) bearing. Midframe, at rear of compressor casing, supports the main turbine structure, its aft frame, and serves as a support for main thrust (No. 2) bearing. Engine main mounting brackets are on the horizontal and vertical centerlines of midframe, located at the rear's C.G.

Combustion Section. Eight cylindrical combustion chambers, supported by the midframe and the aft frame, are arranged concentrically around tubes, and are joined to the frames by clamping rings. Each combustion unit consists of an outer chamber fitted with removable liner and fuel nozzle, two of the eight chambers being fitted with igniter plugs.

During combustion, some compressor air is admitted to the liner at the dome, as front eye balance of compressor air is fed to the liner throughout its length via holes and leaves in the shell, thus serving to dilute the very hot gases in the dome region to the desired turbine inlet temperature (about 1,500 deg. F.) and keep the liner cool. Combustion and dilution processes are complete when the combustion gases reach turbine nozzle discharges.

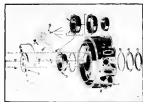
Combustion chambers are joined, one by one, to the aft frame by cross-ignition tube connections into which main compressor tubes are mated, thus linking the individual liners and spreading combustion from one chamber to the next. At aft end of each liner, a transition piece distributes the hot gases to the turbine nozzle discharges. The casing is designed to permit ready placement of transition pieces and liners without engine disassembly.

At frame is bolted to midframe, provides support for the entire engine and exhaust assemblies, and also reinforces the support plate to which combustion chambers are mounted. A fabricated assembly of stainless steel, it induces several longitudinal vibration ridges.

Immediately aft of midframe, a forward



FORWARD FRAME ASSEMBLY (at left): (1) Lower transom, (2) flange for bearing gas casing, (3) housing thermocouple, (4) No. 1 bearing housing, (5) bearing outer race—more race is assembled on rotor, (6) access for air vent openings, and (7) base



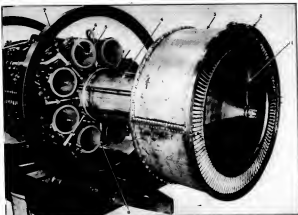
ing of aft. Midframe assembly (at right): (1) combustion chamber opening, (2) fuel nozzle port, (3) No. 2 bearing housing, (4) bearing oil seal, (5) thermocouple, and (6) ports for access Stage No. 2 bearing housing.

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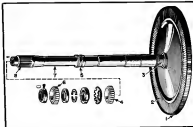
THREE-QUARTER VIEW of engine as disassemblable stand with exhaust case and compression chamber removed. Parts are: (1) Turbine wheel, (2) flange for bolting to exhaust case, (3)

turbine stator casing, (4) air intake, (5) fuel nozzle, (6) bearing thermometer housing, (7) typical bearing cooling air connection, and (8) drain connection for lubricating oil and cooling air.

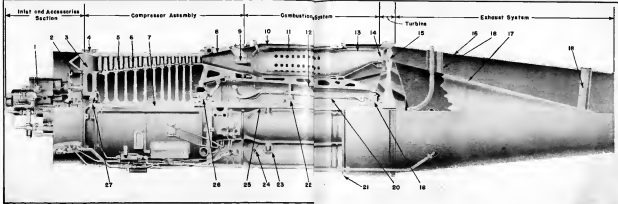
hulls isolate the front part of engine with its fuel and lubrication piping from the hot turbine parts at the aft end. While no engine cooling is required all of the fire wall, insulation or protection is normally required to protect the aircraft structure from radiant heat. The firewall hulls is fabricated thinless steel as an integral part of the engine nacelle casing, depending upon the engine model.

► **Turbine Assembly**—Turbine unit is a single stage impulse-type installation consisting of the turbine discharges and wheel and shaft. The hollow turbine shaft is splined at compressor end to fit splines on compressor eleven stage wheel. Turbine blades, forged heat resistant alloy, are welded to wheel rim and shrouded to improve vibration resistance. Turbine shaft, forged integral with the shaft to provide maximum strength, is cooled by air extracted from the eighth compressor stage and delivered to both sides of wheel, thus helping to reduce heat conducted along the shaft from the wheel hub into the rear housing.

Typical duplicate elements of lubricated



TURBINE ROTOR ASSEMBLY. (1) Turbine wheel, (2) hubless, (3) No. 4 bearing journal, (4) No. 4 bearing, (5) No. 3 bearing journal, (6) No. 3 bearing, (7) turbine shaft, and (8) Main drive spline—fits into compressor rotor hub.



PART SECTIONAL VIEW OF TG-180 turboprop: (1) Accessories, (2) accessory drive gear casing, (3) compressor air inlet, (4) fuel tank inlet, (5) compressor shaft, (6) stator, (7) rotor shaft,

(8) turbine, (9) fuel nozzle, (10) combustion chamber, (11) combustion liner, (12) air frame, (13) transition liner, (14) turbine nozzle diaphragm, (15) turbine shaft, (16) outer exhaust cone, (17) inner exhaust cone, (18) support strut, (19) No. 4 bearing, (20) typical of line and air line supplying No. 4 bearing, (21) turbine support plate, (22) No. 3 bearing, (23) cross section

inner and outer spacer bands with punched holes to receive the ends of 64 equally spaced blades to form the stator. Blades,

fabricated from sheet stock welded to the spacer bands, are not cooled. First is so designed, that after removal

of the exhaust cone, the turbine shaft and nozzle diaphragm may be removed for inspection or replacement without complete engine disassembly.

Shaft and Bearing Arrangements—Main rotor assembly, comprising the compressor and turbine rotors, is fastened rigidly by a spline connection inside the hub of the eleven-stage compressor disk to carry torque, and by a single long bolt, or dowel pin, passing through the hollow turbine shaft into the compressor eleven-stage wheel hub, to carry the axial load of the turbine wheel into the compressor rotor assembly and main thrust bearing.

Main engine bearings are all tapered roller bearing type, for low torque and low heat rejection. Front roller (No. 1) bearing is located in the forward frame on the front end of the compressor shaft. Main thrust (No. 2) ball bearing is on the hub of the eleven-stage wheel and carries the axial thrust of the entire rotor assembly. Bearings Nos. 3 and 4 are roller type, mounted on the turbine shaft and located in the air frame. Bearing No. 3 is a damper unit to prevent excessive shaft vibration.

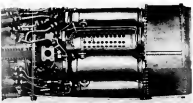
To balance axial thrust on the rotor, air is exhausted from the compressor eighth stage and used to provide a balancing pressure on the face of the first stage wheel.

Exhaust Cone-Discharge—Exhaust gases are collected in the exhaust cone, consisting of a stainless steel outer shell and inner cone supported from the shell by eight transverse struts. From the exhaust cone end, gases pass through the exhaust pipe to the exhaust nozzle, restricted to provide high discharge velocity. It is customary to adjust the size of exhaust nozzle to maintain per cent of exhaust gas temperature in exhaust stream about a constant from a given engine.

Length of the exhaust pipe varies with each installation, and may be greater than ten feet.

(Additional details—covering accessories, lubrication, fuel, ignition, and starting are shown, engine mounting, and pilot's controls—will be presented in our next issue.)

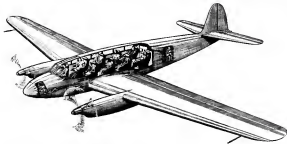
tube, (24) guide plug, (25) turbine shaft bolt, (26) No. 2 bearing, (27) typical of line and air line supplying No. 4 bearing, (28) turbine support plate, (29) No. 3 bearing, (30) cross section



DETAILS OF COMBUSTION CHAMBER INSTALLATION. Clamp rings are visible at junction of the separate units. Transition lugs (not seen) leading from chamber to nozzle diaphragms are housed between bolted circumferential members seen at right.



NEAR VIEW OF TG-180: (1) Exhaust cone, (2) turbine buckets, (3) inner exhaust cone, and (4) support struts.



Italians Start Work on Two New Transports

Siai-Marchetti SM-102, of composite construction, built around American engines. Breda-Zappata BZ-309 is all-metal high-wing craft with tricycle gear.

Italian aeronautical engineers today are progressing from the design to limited production stage of new types designed for postwar operations, according to McGraw-Hill World News reports.

Newest project of Siati-Marchetti is the 8-passenger SM-102, designed for short-haul work within Italy itself. Now in preliminary construction

stages, the craft will be of composite construction—a metal fuselage and wood wings comprised of built-up plywood spars and ribs with plywood covering. Powered by two 450-hp. Ranger SGV-770CB engines, the craft will have gross wt. of 9,700 lb. and empty wt. of 5,700 lb. Wing span is listed as 64 ft., length, 41 ft. and height 10 ft. 6 in.

A slightly larger craft, but being built for the same type of operation, is the Breda-Zappata BZ-309, a high-wing all-metal craft designed for eleven passengers and crew of two. To be powered by two 900-hp. inline engines, design cruising speed is listed at 217 mph. Gross wt. is set at 12,125 lb., empty wt. at 8,050 lb., span, 65 ft., length, 45 ft.



Artist's conception of Breda-Zappata BZ-309 (above), all-metal, high-wing twin prop. designed for eleven passengers and crew of two. With retractable tricycle landing gear, cruising speed is stated to be 217 mph. Span is 65 ft. and wing area is 157 sq. ft. Siati-Marchetti SM-102 composite construction, twin-prop. (right and at top) having span of 64 ft., length of 41 ft., and height of 10 ft. 6 in. Wing area is 157 sq. ft. Gross wt. is set at 9,700 lb., empty wt. is 5,700 lb.



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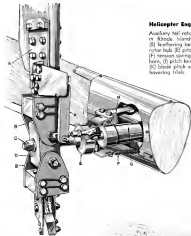
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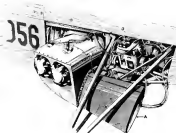


Sketchbook of DESIGN DETAIL



Helicopter Engineering & Construction Model 190

Auxiliary tail rotor detail of single-place craft developed in Rhode Island. [A] Blade retainer and root fitting, [B] feathering bearing retainers, [C] hub retainer nut, [D] rotor hub, [E] pitch head containing internal ball bearings, [F] tension spring, [G] auxiliary rotor gearbox, [H] control horn, [I] pitch lead arm, [J] pitch changing push rod, and [K] blade pitch arm. Craft is now undergoing field down hovering trials.



Underside of fuselage mounting of craft's 75-hp. Continental and accessories. Engine is fitted with exhaust electric cooling system, outlet being through duct [A]. Note how compactly power plant is installed. [Also see March 1947 "Aviation"]

AVIATION SALES & SERVICE

Close-in Airpark Financed By Oklahoma City Businessmen

With investment of approximately \$500,000 in the new Oklahoma City Downtown Airport, financial backers of the new enterprise expect it will amortize the entire cost in a period of 15 to 20 yr. Usage of the new field in advance of its formal dedication scheduled for July 4, indicated excellent progress from both local and transient flyers, due to the field's close-in location.

Situated only 14 mi from the heart of the downtown shopping and business district, the airport was originally planned by city officials as a municipal field. Later the city fathers decided to abandon the project, and a group of Oklahoma City businessmen, most of them private firms, put up the funds to finance its completion.

When completed it is expected to be the East downtown airport in any city of its size in the country, and one of the few in the close-in category to be privately owned. Its financial success will be watched closely by aviation circles, once it now serves as a model for many other such enterprises.

■ **Runways Completed**—The field has a 2,600-ft north-south runway, and a 2,200-ft northeast-southwest runway, and one taxiway plus as large as twin-engine Runways.

Already completed are individual T-hangar facilities for 15 planes and a large hangar for repair and overhaul shops. Additional hangars to provide space for approximately 100 more planes are scheduled for construction immediately, and when the airport building program is finally completed there will be accommodations for a total of 200 planes.

A brick administration building now being completed will house a restaurant, pilot's lounge and airport office.

■ **Stock-For-Work—Ed** McKnight, former AAF pilot, a general manager and executive vice-president of the Downtown Airport Corp., operating company.

Much of the investment that he has been as the firm of services by lease or time who was compensated with stock in the corporation. One did the grading, another provided asphalt for the runways, another provided the land, and still another the architectural and engineering work. Other contractors of the administration building and hangars were contracted for outside the members of the corporation.

Sponsors and observers enthusiastically anticipate early and substantial return from the enterprise. Time and money in the project reflect a new aviation interest characteristic of Oklahoma City, original site of the National Aviation Club, which already enjoys a reputation as a strong supporter of all projects.

Spacious and observers enthusiastically anticipate early and substantial return from the enterprise. Time and money in the project reflect a new aviation interest characteristic of Oklahoma City, original site of the National Aviation Club, which already enjoys a reputation as a strong supporter of all projects.

from center of business and shopping district. Originally projected as a municipal field, airport was abandoned by city officials, as Oklahoma City businessmen now continued development.

Ryan Continues Navion Pricetag

Flyaway figure of \$7,750 remains pending production cost analysis.

Current price of the Navion (\$7,750 flyaway figure) will be maintained until further notice by Ryan Aeronautical Co., San Diego, which will produce the former North American four-place personal and business plane, T. Charles Ryan, President, informed Aviation Week.

Ryan said a detailed analysis of materials and production costs at the San Diego plant would be made to determine whether the price should be changed. His company has made an agreement with the former owner, North American Aviation, to deliver Ryan products until the inventory of Ryan Navions at North American is sold, but he expects it will be disposed of by the time his company is ready to start deliveries.

■ **Ready by October**—His estimate has been met by Ryan and ready to start Navion production at San Diego by late October or early November.

Ryan and he hoped to take up the Navion sales program where it was discontinued by North American and to use the 17 Navion factory orders appointed by North American.

The Navion program may contribute the most commercial aircraft planning of Ryan for the immediate future, at least, and is believed to have resulted in showing several other airplane designs and at least one helicopter.

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UNITED STATES STEEL

reports that Ryan was consulting for development. The Norton will be Ryan's next commercial aircraft, and his 21st plane, including utility projects.

■ **Dealer Reaction**—One dealer's reaction was:

"I will not be surprised if Ryan makes some changes in the Norton directed to greater luxury and comfort, and even the price appreciably. I feel I would not have trouble selling it at \$8,000."

President Ryan said he had no basic changes in mind for the Norton design. "Just as it stands, the Norton is the best of the bunch. That's why we took it on." Norton company would disclose the lock-stock-and-hard-pan price that bought the Norton.

New Stinson Office To Aid Distributors

Keeping one of the basic needs in the aircraft sales and service business, the new Division of Consolidated Value has established a business management office headed by an experienced automotive man who will act as a business consultant and aid for Stinson distributors and dealers in the U. S. and Canada.

Stinson then came one step further a practice common with many suppliers of equipment to distributors and dealers the need for retail business and accounting practices.

All companies, in particular, in recent years have endeavored to meet these duties in continuing to reorganize business practices.

Stinson has appointed Walter A. Simon to head the new office, with the job of working closely with distributors and dealers to organize sales and business management aids.

Before joining Stinson, Simon was business manager for the Detroit race of Chevrolet Motor Co.



NEW AEROMAC LIAISON PLANE

All the dual purpose of 435 Aeromac lightplanes for liaison plane use by Army Ground Force has resulted in Aeromac Model 7842, heavily Aeromac Champion tandem trainer with addition of plunger color top, and replacement of Champion's 65-hp. engine with an 85-hp. Continental with fuel injection carburetor. Aeromac was awarded two-place tandem convert on a bid of \$649 per plane, following competitive term with other lightplanes at \$1,300. Canada. Order also includes 10% additional spare parts for replacement.

Continental Offers Dealer Ad Campaign

A local ad in advertising campaign for dealers and distributors, built around the slogan "Start Flying Now" is being offered by Continental Motors Corp. in connection with a series of ads, the manufacturers is placing in its own hand.

Continental is sending material on the promotional campaign to more 3,000 operators, many of whom are company distributors or dealers. But most of the ads, in a variety of size and shape, are placed due to any operator who will have space in local papers to run the ads. The ads would carry the dealer's own name, with an area of Continental unless the operator is a Continental dealer.

Continental is replacing its competitive type of product advertising with the new campaign with the purpose of selling the

public on the advantages of learning to fly. The ads stress the safety of light airplanes, and the "easy" simplicity and low cost of obtaining a pilot's license. The order is referred to the local operator for full details.

In explaining the increasing demand Continental's action, D. H. Hollowell, Vice President in charge of aircraft engine sales, said the campaign will run for the balance of this year. "Every airport in the country," he said, "has its regular hangar-on-falls who come out dry after due to loss on the fence, watch plane take-offs and landings, and wish they could fly. They represent a potential prospect group which is well worth tapping. It's a safe assumption that more of them are putting off flying lessons because of misapprehensions about the cost and expense involved."

The new Martin "202" composite equipped with Aero-Lite Aluminum Cable



In designing the "202", Martin engineers included aluminum cable, built by Auto-Lite, to save precious pounds of weight and help assure the high performance demanded today of commercial air lines. Aluminum cable is typical of the many advanced products made by Auto-Lite during the past 25 years. . . . advanced products which have again and again proven their dependability.

The specifying of Auto-Lite wire and cable is fast becoming standard practice among leading aircraft manufacturers. There is ample proof of the Auto-Lite statement that "Master cannot buy better wire and cable!" For complete information on the many types of Auto-Lite wire and cable available for aircraft, write to:

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AUTO-LITE
WIRE & CABLE



HELICOPTER CROP DUSTER

Two hopper of 200-lb. capacity each, on either side of the Bell multi-blade helicopter, are loaded with DDT for dusting. The hopper is also loaded with dust, mixed with an insecticide, as seen at bottom of hopper. Downward of help

engine's rotor blades work that sets underside of plant lightly. Helicopter dusts a 60-ft. swath in one trip across a field, and covers between 100 and 200 acres per hr. Helicopter is variation of Bell Model 47, with 170-hp. Franklin.

OATA Seeks Five-point Program

Ohio Aeronautics Association is its first convention in Bowling Green. Ohio voted a five-point program for commercial airports and air traffic conditions.

Meeting in conjunction with the Second Annual Ohio Aeronautics Clinic, sponsored by the State Aeronautics Board, OATA urged the Board to:

- Check plans for new commercial airports.
- Report each phase of an existing airport is within three miles of a proposed site.
- Approve new airports only when there will be at least one runway not less than 1,500 ft. long with a glide path ratio of 1:10.
- Investigate facilities of prevailing air flows prior to introducing aircraft on the ground.
- Regulate airport pilots to have proper CAA certificate and to take off and land only in cleared areas where they will not endanger traffic.

Supporters of aviation were cautioned against trying to "take things down piecemeal" when promoting new airports.

Dr. De Haven, head of the Coast Range Research Institute at Cornell Medical College, New York, reported that one less illness could save eight required police officers.

Police officers attending the Clinic's enforcement program were urged to clamp down on violation of the State's new flying regulations after they become effective July 14.

John F. Gallahan of the Chicago CAA office advised them to concentrate on low and medium tiers, the most frequent violators.

Michigan Resumes Airmarking Program

Michigan's Department of Aeronautics has set a goal of airmarking 100 towers in the state this summer, and has already completed 25, Walter J. Carr, its airmarking coordinator, reports.

The 100 towers, when airmarked, plus the 116 construction projects in 1946, will make the state error better marked than it was before the war.

In the time the state emergency made necessary elimination of airmarking through out the country, Michigan had signs on 468 towers.

The signs are yellow, and are painted in letters 16 ft. high on the tops of towers, the buildings.

The state furnishes the paint and has two contractors in the field to do the work. At local groups wish to do the marking, the state supplies the paint and brush.

BRIEFING FOR DEALERS AND DISTRIBUTORS

FAIR NAVION RIDES—Navion dealers are advertising to give away five seats to businessmen who can be potential buyers of the low-price all-metal airplane, which has been adopted by Ryan Aeronautical Corp., San Diego, from the original prototype, North American Aviation, Inc. The factory dealer offerings, appearing in literature packets, offer the businessman a five-lesson trip by Navion to anywhere within 150 mi. radius and up to 5,000 ft. in the plane at the very close of the airport nearest his home or business. "All we ask is return a few minutes during the flight to explain how the Navion costs no more than a car to drive, and how businessmen everywhere are finding that this car-to-fly plane is a money-maker for them," the advertisement continues. "We do want you to see for your self what business airlines have been unable to provide planes cause the war." If the advertising develops even a few good prospects, among businessmen who can get real utility out of the four places, and if the dealers serve the sales to eliminate those who are quick to say to cash in on such offers, but have no intention or ability to buy, the promotion promises to be well worth while.

DUCK FLYING—Canadian Aircraft Corp., manufacturers of the thoroughly duck amphibian, which will not sink and which it wants to get to fly fast in its powered glider market, met with a check-out to find out if there is a market for its amphibian. The idea is to let the operator fly the plane as if it were his own, using it as an extra top of aviation service, his choice and giving the plane a good general workout. After operation is checked in this the amphibian can soon and might later, succeed in flying, being tested and it will have the dealer credit by the CAC office.

AERO MEDICAL DIAGNOSIS—Despite accident records since the introduction of medical examinations for private pilots, which indicate that the physical examination has very little if any bearing on the accident record, the Aero Medical Association of the United States, composed of the physicians who used to make medical pilot examinations before the introduction in civil aviation of CAA's for letting down the barriers and making it possible for the less-than-perfect man to fly. In contrast, the non-berkeley Flying Advisor, Grant, writes for CAA that CAA's will use one physical exam and that the pilot's condition is reported only one physical exam for the pilot's pilot, with no further examination required, even at any time. Accident statistics indicate that the "best pilots" who fly low and slow, and the casual pilots who let themselves get caught in bad weather, cause more severe accidents than any physical ailments or handicaps. In fact the physically handicapped pilots in most cases are among the safest, because they are extremely cautious, and because they usually have spent more time and effort in learning to fly.

BRITISH DISCOVER THE PRODIGE—Recent news of British aviation progress, which said that the country have at long last discovered Ford Wood's excellent two-control jet-powered airplane, which after nearly two years of patient perfection, is still the only airplane, we know being marketed which can be used as a low-cost plane. The entire writing of Stanley Davidson, in a recent issue of *Airplane* recalls some of that first glow, which surrounded the airplane in this country in its press run, and which has since, and for no good reason, been too much forgotten. The British built the Prodigé a strong performance, which he says "would have turned a London taxi-driver away from his car with ease." He is quite well-off about the plane's ability. "It could stand in a line with the best in the sky, one wing well down, the wheel back lock, and the engine running, waiting for a kick, once the 40 mph mark." After flying the plane himself, and finding the two-control version comes quite naturally, he concludes: "We need as much efficient progress as can be built into the personal planes of today and tomorrow. When it can be achieved, as in the Prodigé with its little version of one of actual handling characteristics, and in flight, there is no excuse for the delayed pursuit of the old way."

KLENKE FORECAST—Bill Klenke, Stinson sales manager, predicts that personal plane business will taper off again this fall and winter after a good season of sales made in the personal plane market, which he says. So Stinson is planning to begin tapering off production as well as to begin with this expectation, but will strengthen its retail sales examination in preparation for another seasonal spring and summer. The Winter, Mich. division of Consolidated Vultee Corp., for the first time in its 21-year history, has over 100 retail sales and service outlets, which have sold more planes in the last six months than in any similar period in Stinson history, he reports. After a national line of Stinson dealers, Klenke feels that this time in stock an average of less than one new plane to a dealer, but he predicts "difficult conditions" in the next few months for manufacturers and dealers who are crowded on new plane production and short on working capital.

AIRPORT TITLE SUIT—Said to acquire title to a privately operated airport, filed in the Minneapolis-St. Paul Metropolitan Airports Commission, may be, as the commission tries to take over the airport and inspect it in the public interest. But it is the kind of thing that might also be a question who before or after independent review, and who subject to government competition with private business—should watch very closely. If an airport is in its commission can take over any private airport, is a simple procedure of taking it to claim it and paying off an approved valuation, if there is any, experiment. But political guidance, especially the one for the operators to have and make, is a serious one. A lot of local government level, is in forming an aggressive and locally local operator organizations which will to organize such action and make its control substance felt in the interests of progress in aviation.

Alexander McQuay

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AIR TRANSPORT

Domestic, Trans-Atlantic Carriers Show First 1947 Operating Profit

Industry's improved earnings during April make only small dent in huge deficit for first quarter; Eastern continues to set pace.

By CHARLES ADAMS

With Eastern Air Lines continuing to furnish most of the power, the domestic air transport industry during April pulled out of the financial woods for the first time this year.

None of the 16 scheduled airlines contributed their first three months losses into the second quarter. But overall operating profit for the industry, led by Eastern, was a surprising \$1,340,964 net, or \$59,513.

Small Dent—The improved showing in April makes only a small dent in the whopping \$15,740,332 operating deficit during the first quarter. Moreover, the April profit of \$59,513 was still substantially behind the some 1946 month, when the same carriers earned around \$470,000. Cumulative first four months figures show the domestic airlines with an \$18,712,867 operating deficit in 1947 compared with a \$4,035,755 loss in the same 1946 period.

U. S. flag carriers on the trans-Atlantic route shined in the April seasonal gain. Between American Overseas Airlines' \$704,250 operating loss was a \$163,209 operating profit by Pan American Airways' Atlantic Division and an \$48,193 profit by TWA.

Torden Gain—The air freight carrier during April pared their losses from the high level of the first three months, but with the exception of Precision Air Lines continued in the red. Precision earned \$28,312 on operations in April, largely because of a recent CAB order which gave the carrier 60 cents a plane mile mail compensation for the period September 1946, through May 1947. Other freight mail pay is still at the 14 cents a plane mile temporary rate.

Adjustments in mail compensation have resulted in a gradual trimming of air carrier losses from original figures issued by CAB for 1946 and undoubtedly will drive the 1947 losses smaller. Example of a complete reversal in a company's financial position was seen last year when National Airlines finished 13 months with a \$254,000 net loss that changed to a 12-month operating profit of \$190,707 following a retroactive mail pay boost.

Western, PCA Profit—Mail pay adjustments this spring have resulted in the better overall picture of Western Air Lines and Capital Airlines (PCA), two of the high deficit carriers last winter, in the profit column this spring. PCA reported \$48,083 operating income in April and \$49,759 operating income in May against a 544 quarter loss of \$2,315,000. Western earned \$31,404 in April against \$665,068 operating loss for the first quarter.

Other April operating results with first quarter figures in parentheses are: American, \$75,696 profit (\$4,644,686 loss); Bonair, \$11,743 loss (\$352,794 loss); Chicago & Southern, \$38,844 loss (\$525,708 loss); Colonial, \$71,250 loss (\$401,514 loss); Continental, \$26,794 loss (\$257,506 loss); Delta, \$145,200 profit (\$279,507 loss); Eastern, \$8,306,964 profit (\$6,464,590 profit); Island, \$4,634 profit (\$68,263 loss); Mid Continent, \$32,119 loss (\$99,446 loss); National, \$99,255 profit (\$147,444 profit); Northeast, \$84,618 loss (\$449,560 loss); Northwest, \$724,727 loss (\$1,895,499 loss); TWA, \$164,323 loss (\$1,477,781 loss); United, \$315,774 loss (\$5,133,391 loss).

AOA Leads Field On Atlantic Run

American Overseas Airlines is making the 1946 one-way air trans-Atlantic service, but claimed preponderance among the eight carriers flying the U.S. Europe route.

The carrier reports operating more than Atlantic flights and handling more than 100,000 passengers than the first four foreign flag companies combined (Air France, KLM, BOAC, SABENA and Scan Airlines). American Overseas states that it is providing approximately 12 percent of the seats offered by all trans-Atlantic carrier U. S. and Europe.

24 Roundtrips—Under its present schedule, AOA operates 24 round trips weekly to Europe, compared with a combined total of 23 roundtrips offered by foreign flag airlines. Other American carriers fly 32 round

trip weekly, making an overall total of 78 roundtrip flights, or 2,647 seats each way, between the U. S. and Europe.

In contrast to the past of Wright Sikorsky flying boats with which competitors in Europe, Rome, were begun June 28, 1942, AOA now uses 10 DC-4s and seven Constellation. Flight During Statesmen are to go into service only next year. Employment has grown from 135 in 1942 to 3,441 today, including 1,437 stationed abroad.

During the last five years, American Overseas has flown 68,275 passengers, \$31,218,000 passenger miles. It has carried nearly 2,000,000 lb. of cargo and 2,357,390 lb. of mail between the U. S. and Europe.

Record Return—AOA handled a record of 344 returning passengers during the first week of June, achieving a 99 percent load factor. Last minute cancellations prevented filling 10 seats. Weathered traffic was approximately at heavy. The carrier reports that it has received sufficient advance reservations to assure capacity loads for all month over the Atlantic flight between now and October.

PAA Again Protests Atlantic Route Pattern

Pan American Airways has extended its pleas of protest against the existing allocation of U. S. flag air routes to Europe with a new request that CAB modify the North Atlantic route between June, 1945. The carrier is asking for a certificate authorizing nonstop service to Paris and Rome, and there is now ample experience to show that the pattern set up in the North Atlantic system should be changed.

TWA has a "fractured monopoly in Europe and Asia" as an Atlantic flag competitor is "concerned," PAA declared, adding that because of its favored position, TWA was able to secure 1810 scheduled trans-Atlantic passenger and 214,000 lb. of scheduled mail between Jan. 1 and Apr. 13, 1947, against 1,706 trans-Atlantic passengers and 145,080 lb. of scheduled mail for PAA. Citing large weathered passenger loadings at Paris and Rome during the winter, Pan American said TWA had been unable to handle the volume of traffic available to it in its monopoly territory.

PAA noted that because of the lack of landing rights in the Balkans it was obliged to fly from London over France and Italy to Istanbul, Turkey, without a traffic stop. The carrier proposed that in exchange for authority to serve Paris and Rome for three weeks in the London Istanbul link its own route beyond London on the New York Lisbon Barcelona Marseille route be suspended.



How EDISON

thermocouple fire detection meets ideal requirements

ITEM VUL-1 OF REPORT NO. 2 of Aeronautical Industries Association (AIA) Subcommittee on Aircraft Fire Detection. Airworthiness Project No. 7, dated May 27, 1945, sets requirements for the ideal fire detector. See how the performance of the Edison system compares with these ideal requirements.

The IDEAL Detector (From AIA Report)

- It should be ruggedly constructed so as to resist exposure to gasoline, oil, dirt, water, vibration, fatigue, salt air, and handling.
- Detector circuit should require no current until the actual alarm has signalled, unless a supervisory system is used.
- It should fail safe. I.e., in case of circuit failure it becomes inoperative rather than give a false alarm.
- A test button should be provided to check the entire system.
- There should be no moving parts in the circuit.
- The detector should be able to withstand more than one fire without having to be replaced or calibrated.
- The detector should indicate when the fire is extinguished.

The EDISON Detector

- It is rugged and amazingly simple . . . just a piece of wire that is mounted in each potential fire zone . . . that's all there is to a thermocouple.
- Thermocouple detector requires no battery current. They generate their own current, and they send a "FIRE" signal only when there is a fire.
- Should a thermocouple circuit fail, it could send no signal . . . couldn't give a false alarm.
- The push of a button checks the entire Edison system.
- There are no moving parts of the system in the fire zone. The only moving parts are the relay contacts located in the signal system.
- Thermocouple detector will withstand many fires without need for replacement or calibration.
- A thermocouple detector signals "FIRE" out and it again ready to signal "FIRE" after conditions return to normal.

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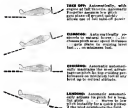
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Robinson to Argue Regional Airline Concept Before CAB

New York intrastate carrier points to high traffic generation from small cities; Sees better, cheaper service than feeders can provide.

A two and a half year struggle for certification in one of the Nation's key, crowded intrastate carrier cities has just passed this week when Robinson Airline, Effect N. Y., appears before CAB in oral argument on its Middle Atlantic route case.

Now boasting the highest traffic volume of local airlines with standing flights in April, 1945, Robinson will try to convince the Board that its unique "regional" service will generate more business at low cost than any other non-feedline type operation. The carrier contends that its own experience has shown that small cities in this region support a bus, that provides frequent, one-stop, high-speed service, to surrounding metropolitan areas, but that the same communities can furnish links, traffic for the metropolitan local schedules of the airlines or the comparatively slow, grasshopper-like feeder operation.

Cities From Hubs—Robinson uses Ithaca and the nearby triple cities (Binghamton, Elmira and Johnson City) as a hub. This hub area is linked to the three metropolitan centers with which it has the greatest community of interest—Albany, New York and Buffalo.

When dropping to a low of 35.5 percent last January, Robinson boosted its load factor to 61.1 percent in April. May load factor rose to 66.2 percent, and the preliminary figure for the last half of June was 66 percent.

Traffic High—By contrast, the air certificated localities operating during April showed load factors ranging from 14 percent up to 46 percent. Robinson's revenue passenger miles in April—51,605—was exceeded by only one of the certificated feeder carriers, Capital Cities.

During May, Robinson's low plane-plane Beech D-188 transports carried a record 2,096 revenue passengers, 342,252 revenue passenger miles. Eighteen percent of the scheduled mileage was completed.

Where Results—To support its contention that a regional airline can tap the full benefits potential of small cities, Robinson points to its experience in Rhode, a community of 20,000 plus 35,000 Cornell University students. More than 50 percent of the others traffic originates or terminates at Ithaca, with weekly passenger receipts averaging about 260 and reaching a peak of more than 300.

The surrounding traffic, with low expenditures, originates or terminates in the triple cities, which have a combined population of about 115,000. Only an occasional rail

passage through the Ithaca triple city links its route between New York and Buffalo or New York and Albany since this status is furnished by the transline.

Defect Penalties—President C. S. Robinson frankly admits his carrier is not making money, despite the expense load factors and an 8-cent-a-mile rate per passenger. However, he asserts positively that the company could make money as a certificated operator if granted the same mail pay of 5¢ cents a plane mile which the airlines are paid and would consider acceptable.

Without mail pay, Robinson believes its 60 percent load factor will be sufficient to break even with D-188 equipment. Certification would also permit carriage of passengers and cargo originating in or destined for other cities. Robinson would not waive the license.

Costs Given—Total operating costs with the Beech line have been running around 45 cents a plane mile, according to Robinson. The airline employs 160 persons, a staff of 16.5 per operating plane, and has no origin and traffic and public relations department, station generalist, position insurance drivers, no accounting department and a company organ.

Operations department consists of 14 captains and co-pilots, plus two reserve captains holding office positions in the company. A single dispatching section of 10 persons is headed by a licensed meteorologist and dispatcher maintaining weather telegrams and radio-aid VIII radio contact.

Low Unloadings—The flying time runs from 7 AM to 5 PM. These maintenance shifts are required with the majority of work being done at night. The carrier claims to change hands all but major engine overhauls.

Robinson says the low rate of employees to planes more than offsets the low rate (its headline rate) of aircraft utilization, which now exceeds 8.5 hours daily. However, it admits plane utilization that this of the transline is inherent in the regional concept, which involves peak traffic loads during the morning and evening.

Service Competition—Although charging 8 cents a mile, Robinson's fares are usually only close to those for railroad passenger transportation. Because of nonstop service, reduced distance between New York and Ithaca is 320 miles against 470 miles by plane. Buffalo, New York and Albany—all within 90 minutes of Ithaca and the triple cities by Robinson Airline—can up to some extent serve as surface transportation.

Regional Schedule—Robinson offers Albany and the triple cities three round-trip flights daily to New York, and two round-trip flights to Albany and Buffalo. An extra flight to New York is made on Friday and Sunday.

Traffic Shift—At present, Robinson uses Beech D-188s on its New York intrastate route, but it plans to shift to the Lockheed N-1, upon it is certificated. In the middle of September, the carrier hopes to have its own airport—within two to three miles—completed on a site four miles from the heart of Ithaca.

The carrier's certificate applies, data filed in 1944, concerning routes across, from the Ithaca area to Rochester and Binghamton, D. C., in addition to the other non-long haul.

Airline Passenger Traffic Up 16 Percent

Scheduled carriers, including feeders, report 720 planes in use; average volume rising.

Airline passenger traffic during the first ten months of 1947 ran about 16 percent higher than the corresponding levels of the corresponding period in 1946, but the year thus far continued to be below the 75.50 percent increase forecast by industry traffic officials last December.

Revenue passenger mileage, as cited 1,742,000,000 in the last fiscal of 1947, rose to 2,014,794,134 for the same period last year, the Air Transport Association reports. All other factors (reports except an actual change in passenger load factor) of the conditions described as the most as to transportations.

Carriage Gains—Airline's growth 254 percent to 5,746,811 two weeks from 2,115,151 in the first ten months of 1946. An increase of 57.5 percent to 9,297,495 two weeks from 5,901,497, while revenue passenger miles rose 11.4 percent to 59,595,235 from 53,175,214.

At the end of April there were 171 new aircraft in scheduled domestic service with a year ago ATA said, and available for use for the first ten months were up 12 percent.

Following a record 740 planes increase in 1946, 29 aircraft were added during the first ten months of 1947. In May, 1947, planes numbered 1,202 by the Civil Aeronautics Board, bringing the total fleet of the scheduled airlines to 710.

Feetmen Included—Included in the report were 40 planes operated by the Civil and All American Airlines on all pilotage routes. As of June 1, Pacific Air Lines was using six planes, Northwest, one, Chalk-Logan, three, Frontier, one, Florida, three, Northwest, one, West Coast, one, and All American, none. Traffic figures also cover feeder operations.

The increased use capacity on the scheduled airlines, which resulted in the dropping of passenger load factors to a point was low at 55.8 in February, began to 63.9 by late in May. April load factors were 72.5

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Mountain Leaves TWA for I T & T

Joseph D. Mountain, TWA captain and former AAF colonel who for the past year has headed the airline's all-weather flying committee, has resigned to become special assistant to the vice president of International Standard Electric Co., an International Telephone & Telegraph Corp. subsidiary.

In his new post, Mountain will supervise the development, manufacture and exportation of automatic navigation equipment and similar devices. He also will supervise all flying activities of I T & T and its associated companies.

Work originally started on by TWA's all-weather committee heretofore will be continued by the carrier's Director of Operations Engineering, J. E. Harrington, in cooperation with the operations department of the airline's transportation and international divisions.

Other personnel developments:

► **Amesco**—Has appointed G. J. Bonito to head its new Materials Department and has named John C. Dwyer as Corporate Personnel Director. Francis Dwyer of Sales for Carter Wright Corp., Bensenville will have control of materials purchasing, manufacturing, assembly control and quality control. Dwyer replaces Louis A. Trond, who resigned.

► **American Overseas**—Kenneth Musick, assistant secretary, has been appointed Director of Planning to succeed H. D. Doolittle. Star, who recently was elected secretary treasurer. Musick will continue as an assistant secretary. Thomas O. English and Robert E. Tinsworth have been elected assistant treasurer and assistant secretary, respectively. Thomas J. Harn, former, American Airlines' New York City area manager, has been named European cargo sales manager by AOV.

► **Eastern**—Melvin H. Flanagan, branch station manager at Corpus Christi, Tex., has been appointed station manager at Birmingham, Ala.

► **McCarroll**—W. C. England, Jr. has been named director of public relations. He has been named district office manager at New Orleans.

UAL Eyes Faster Coast-Coast Run

United Airlines will go straight coast to coast with American and TWA between New York and Los Angeles July 14 when it inaugurates its one-stop DC-6 service between the East Coast and So. California. Preliminary schedules filed with CAB indicate that UAL will fly to better both American's and TWA's time to the east-bound run. All daylight service is planned usually, with flights leaving westbound from New York at noon and enroute from Los Angeles at 8:25 A.M. Gals on to midwest stop in Chicago.

Four to a CAB decision May 19 cut-

solidating the carrier's nonstop transcontinental service. The DC-6 plane to replace all 487s now in service on its Fast Eastern routes with the new two-door, 28-ton Plymouth, was due here before delivery.

► **TWA**—Was denied no star. Consideration service into Cincinnati last week. First nonstop New York Cincinnati flights were to begin at the same time. Carrier intends to inaugurate service to Wilmington, Del., and Allentown, Pa., around Aug. 1 and to Vallejo, Calif., in the Grand Canyon area, this week.

► **American**—Started nonstop DC-6 service between New York and Cincinnati early this month.

► **Northeast**—Was to begin serving Elm Grove, Wis., last week.



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Colonial Again Loses Bid For Latin America

Colonial Airlines has lost again in its bid for a route to Latin America. CAA has denied the carrier's petition for reconsideration of a Board decision in May. (Aviation News, June 2) which failed to authorize occasional service from large East Coast cities to the Canal Zone.

The May decision had withdrawn the steel tubes in the Board's past year in the Latin American case when applications of Colonial, Eastern and National for through service between points as Eastern U.S. and Mexico, C. Z., via the West Indies were turned down. Colonial was encouraged to file the petition for reconsideration of the May decision by CAA Member Jack Lee's dissent saying that the carrier he grew to know from the continental New York-Washington-Philadelphia Norfolk to Dallas via Charleston, Nassau, Cancun, Kingston and Barranquilla.

Philippine Air Lines Gets Route to San Francisco

Philippine Air Lines has been granted CAA authorization to operate between Manila and San Francisco via Honolulu. In issuing the license on carrier permit, the board noted that PAA had been designated for the service by the Philippine government, with which the U.S. signed a bilateral air transport agreement last November.

PAL has been flying the trans-Pacific run under contract since last July, using DC-4s supplied and manned by Transocean Air Line. The Philippine carrier recently purchased five Eastern Air Transport (Aviation News, June 9) and intends to place DC-4s on trans-Pacific service this fall.

In addition to its U.S. operations, PAL flies home based in the Philippines and to China, Singapore and Bangkok.

Insurance Paid

Twenty-eight airline trip insurance policies totaling \$241,680 were purchased by passengers aboard the Colonial Air Lines Eastern Air Lines and Capital Airlines DC-4 which crashed in May and June.

Associated American Underwriters, New York, which sells a \$5,000 round-trip policy for 25 cents at all airline counters, reports it has already paid most of the beneficiaries.

POA-Siam Starts Service

Pacific Orient Airlines Siam has started DC-4 flights between Bangkok, Shanghai, Manila and the West Coast. Until a foreign air carrier permit is granted by CAA, the company will operate on an irregular basis, using American crews under a contract with Pacific Overseas Airlines, Ontario, Cal.

AVIATION WEEK, July 7, 1947

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Aviation Week Takes Its Stand

Aviation Week, in its first issue, presents its editorial viewpoint on top aviation news. In the tradition of its two outspoken predecessors, *Aviation* and *Aviation News*, this new magazine, on this page, will leave no opportunity for doubt on its editorial position.

Yet the technical and news pages will be maintained rigidly impartial. Every editor and correspondent is under strict instructions to base every report on the significance of his facts to commercial aviation, and on service to industry.

Challenging comment from readers is not only invited. It is essential if any publication is to remain vigorous, informative, and attain indispensability to its readers. Every letter received from readers who indicate their opinion of this first issue of *Aviation Week* will be acknowledged. A letters column will be introduced in the near future, where readers may argue with the writers on *Aviation Week*, or with the editor for the opinions expressed here.

The following stance on current issues may start the argument:

Competition: A strong conviction for the private enterprise system is responsible for an abhorrence of unnecessary monopoly. The chosen instrument of community company proposal demands necessary monopoly. *Aviation Week* is unequivocally against it.

Attitude Toward Government and Industry: Although an aviation business paper, *Aviation Week* does not condone espionage and inefficiency in any state or federal government aviation agency. It is common practice of the defenders of waste to cry treason when an aviation magazine attacks an aviation agency editorially on such charges. Let them cry. The facts will speak for themselves.

Inefficiency and short-sightedness are as worthless of business and industry as of government. But they seldom flourish so easily in business. Competition sees to that.

The trend to government paternalism has increased the public subservience to many of government's dicta. The press has no greater opportunity for public service than its ability to shed light on the policies of government and the motives inspiring them.

Military Aviation: Readers of *Aviation* and *Aviation News* have read for months of the deterioration of our air forces, and the deep concern felt by our military and naval leaders. Fortunately, the newspapers in recent weeks have awakened to this problem. *Aviation Week* is convinced that continuation of an air force in being—the biggest in the world—back to an effi-

cient and explicable aircraft manufacturing industry, are the keys to peace. It is obvious that no other country must be allowed to surpass us in research.

Yet, we do not want the sky darkened by aircraft, nor the public's money squandered on unnecessary and second rate procurement, nor on WPA type research system. Those who direct our Army and Navy expenditures owe us great obligation to the taxpayer to deliberate his funds wisely as they do to protect him from foreign aggressors. *Aviation Week* will never fail to strike out editorially against mismanagement, stupidity, and pet idiosyncrasy, in the military services as in any other field.

Private Flying: We know of no other aviation publication which have reported so consistently and so constructively through the years the activities of the nation's fixed base operators. Editorial support has been forthcoming time after time because of our faith in this phase of aviation.

Despite the recent downward trend in personal aircraft production, sales and service, the future of personal flying over the long pull must be a growth-idea. The dangers we see and hear today are those who consider our problems insuperable. They ignore the drive for perfection, the technical potential of the country, and the possibility of far-reaching discovery.

These discoveries are inevitable, and those who turn thumbs down on personal aviation will be proved as wrong as those short-sighted skeptics in Billy Mitchell's day who said the airplane would never amount to anything in war.

Air Transport: McGraw-Hill's deep interest in air transport is evidenced by its publication of a monthly magazine by that name. The nation's airlines are the finest the world has ever seen. *Aviation Week*, like the magazine *Air Transport*, will comment editorially on developments in this dynamic industry.

But the possibility of drastic and unfair restrictions which may be clamped down by the President's accident investigating board suggests the darkest cloud on the horizon. This editorial page will consider the President's board a matter of top priority. U. S. airlines already are far superior to the carriers of all other countries, in safety as in other categories. Many airline-wise persons already refuse to fly on foreign-operated transports because of questionable maintenance and operations procedures and general technical inferiority. The Board must not be the instrument for setting back our own lines, yet permitting foreigners to come into this country under inferior standards.

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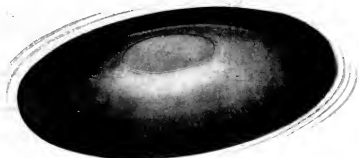
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